REMARKS

Claim Rejections

The Examiner has rejected claims 24-25, 29-35 and 36-39 under 35 U.S.C. § 102(b) as being anticipated by Christin et al. (U.S. Patent No. 5,904,957). The Examiner has also rejected claims 37 and 41-42 under 35 U.S.C. § 103(a) as being unpatentable over Christin et al. The Examiner has also rejected claim 35 under 35 U.S.C. § 103(a) as being unpatentable over Christin et al. in view of Porter (U.S. Patent No. 5,626,680). The Examiner has also rejected claim 40 under 35 U.S.C. § 103(a) as being unpatentable over Christin et al. in view of Liu (U.S. Patent No. 6,403,491) and Porter. The Examiner has also rejected claim 26 under 35 U.S.C. § 103(a) as being unpatentable over Christin et al. in view of Murugesh (U.S. Patent No. 6,450,117).

Applicants have carefully considered the Examiner's comments. In an effort to further clarify the scope of the claims, Applicants have amended claims 24-28, 31-34 and 36-42. Claim 28, which was previously cancelled, has been reentered with amendments. Accordingly, claims 24-42 are currently pending in the application. It is respectfully submitted that the Examiner's rejections based upon Christin et al. have been overcome by the amendments above. In further support of Applicant's claims, a declaration of James W. Rudolph, one of the named inventors, is also submitted for consideration by the Examiner.

Applicants have amended the claims to specify that the inlet duct to the furnace is in communication with a sealed preheater. Substantially all of the gas entering the furnace through the inlet duct passes through the sealed preheater and exits through a discharge opening. The discharge opening of the preheater is in communication with an inlet opening through the base plate which is sized to direct a first predetermined portion of gas to the center opening region of each stack of porous structures. The discharge opening is also in communication with a plurality of openings extending through the base plate to direct a second predetermined portion of gas to the outer region of the stacks. The plurality of openings are disposed around each stack of

porous structures and in proximity to the entire outer region of each stack in order to provide a uniform gas flow around the circumference of each porous structure.

As shown and described in the specification, the gas enters the furnace through inlet ducts 14 and passes through a sealed preheater 18. (Pg. 7, line 29 to pg. 8, line 6; pg. 11, lines 7-16; pg. 12, lines 28-32; pg. 14, lines 7-11). The gas exits the sealed preheater 18 through discharge openings 20 in the furnace floor plate 22. (Pg. 7, line 29 to pg. 8, line 6; pg. 11, lines 7-16; pg. 12, lines 28-32; pg. 14, lines 7-11). A first predetermined portion of gas passes from the discharge openings 20 through an inlet opening 53 (Figure 1), 84, 88 (Figure 9), 108 (Figure 10) to the center opening regions 5 of the stacks 4 of disks 2. (Pg. 8, lines 24-26; pg. 12, line 32 to pg. 13, line 5; pg. 14, lines 17-19). A second predetermined portion of gas passes from the discharge openings 20 through a plurality of openings 62, 74 (Figures 1, 9 and 10) in the base plate 46 (Figure 1), 82 (Figure 9), 104 (Figure 10). (Pg. 11, line 30 to pg. 12, line 7; pg. 12, lines 22-26; pg. 14, lines 14-17). The plurality of openings 62, 74 (Figures 1, 9 and 10) are disposed around the circumference of each of the stacks 4 in order to pass the gas to the entire outer regions 11 around each of the stacks 4 of disks 2. (Pg. 11, line 30 to pg. 12, line 7; pg. 12, lines 22-26; pg. 14, lines 14-17).

By contrast Christin et al. is directed to a furnace assembly where all of the preheated gas flows to the center opening region or the outer region of the stacks. As stated in Christin et al.:

> The gas is admitted only into the volume constituted either by the empty space formed by the central passage(s) of the stack(s) of substrates, or by the empty space around the stack(s) of substrates. [(Col. 3, lines 19-22).]
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> The preheated gas coming from the diffuser plate 22 is channelled towards the volume constituted by the interior passages 31 of the stacks 30. To this end, the blocks 25 between the diffuser plate 22 and the bottom support tray 15a are constituted by rings of diameter equal to or slightly greater than the diameter of the holes 15 and they are in alignment therewith so that the gas is directed exclusively into the passages 31. The diffuser plate 22 is provided with perforations 22a solely in register with the passages 31. [(Col. 6, lines 49-57).]
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> In this way, the gas coming from the preheating zone is channeled towards the internal passages 31 of the stacks 30 and then flows from the inside towards the outside of each stack 30 into the volume 36 of the

> chamber outside the stacks 30, from which it is removed via the perforated plate 26 and the outlet ducts 17. [(Col. 7, lines 1-6).]
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> channeling the admitted gas towards only one of the two volumes constituted by the interior passage of the at least one stack and the outside of the at least one stack . . . . [(Col. 10, lines 47-49).]

Despite this explicit disclosure that Christin et al. relates to directing all of the gas to the center opening region or the outer region, the Examiner argues that a second portion of gas passes through the legs 23 which support the base plate 22 and around the outer edge of the base plate 22 along the chamber wall 19. (Office Action at 13). The Examiner cites no description in Christin et al. that supports this proposition. Instead, the Examiner appears to be relying solely on an interpretation of the figures for this argument. However, assuming *arguendo* that the Examiner's interpretation is correct, Applicants have amended the claims to clarify that the claims do not cover this arrangement. In particular, the claims require that the preheater be a "sealed preheater." By contrast, the Examiner's argument hinges on the preheater 20, 21 in Christin et al. not being sealed. That is, if the preheater 20, 21 were sealed in Christin et al., none of the gas would pass around the outer edge of the base plate 22 as the Examiner has argued. Thus, the Examiner's interpretation of Christin et al. only makes sense if the preheater is not sealed and gas is allowed to escape from the sides of the preheater 20, 21. Applicants have also amended the claims to clarify that a plurality of openings extend through the base plate to direct the second portion of gas uniformly around the outer regions of each stack. The clearance that the Examiner is relying upon between the base plate 22 and the chamber wall 19 of Christin et al. does not disclose, and is not equivalent to, this limitation because the clearance gap that the Examiner relies upon only extends around the outer edge of the furnace and does not extend through the base plate; is not a plurality of openings; and is not disposed in proximity to the entire outer region of each stack.

As noted in the attached declaration of Mr. James W. Rudolph, even if a second portion of gas passes around the outer edge of the base plate 22 in Christin et al., this portion of gas would be exceedingly small and undesirable. (Rudolph Decl. ¶ 3). The diameter of the type of base plate used in Christin et al. is usually designed to be 0 to ½

inch less than the diameter of the susceptor wall. (Rudolph Decl. ¶ 3). It is necessary in conventional furnaces to minimize any such gap between the base plate and the susceptor wall because any clearance between the base plate and the susceptor wall will have several undesirable effects. (Rudolph Decl. ¶ 3).

First, any gas flow between the outer edge of the base plate and the susceptor wall will be uncontrolled. (Rudolph Decl. ¶ 4). In particular, any clearance that may exist between the outer diameter of the base plate and the susceptor wall will not be consistent and even around the entire diameter of the base plate. (Rudolph Decl. ¶ 4). That is, in any particular case, the clearance between the base plate and the susceptor wall will vary anywhere from 0 inches along one portion of the outer diameter and ½ inch around another portion of the outer diameter. (Rudolph Decl. ¶ 4). Thus, any gas that flows through such a gap will be inconsistent, and the volume of the gas flow will vary around the circumference of the base plate. (Rudolph Decl. ¶ 4).

Second, the gas that flows around the outer edge of the base plate is not useful for the intended purpose of infiltrating the porous structures with a carbon matrix. (Rudolph Decl. ¶ 5). In particular, the gas flow around the outer edge of the base plate flows straight up along the susceptor wall and does not flow uniformly around the outer region of each stack. (Rudolph Decl. ¶ 5). For example, referring to Figure 2 of Christin et al., assuming that a small portion of gas flows up along the right wall of the furnace, this portion of gas only flows along a portion of the right side of the right-most stack. (Rudolph Decl. ¶ 5). In other words, no gas will flow along the remaining outer region of the right-most stack, including, for example, the left side of the right-most stack. Similarly, none of the gas that passes around the base plate will flow along any portion of the outer region of the center stack. (Rudolph Decl. ¶ 5). Moreover, the temperature of the gas passing between the base plate and the susceptor wall will be uncontrolled since the escape gasses have not fully passed through the preheater. (Rudolph Decl. ¶ 5). Thus, to the extent that a portion of gas escapes through the clearance between the base plate and the susceptor wall, this portion serves no useful purpose. (Rudolph Decl. ¶ 5).

Third, any gas passing through the clearance between the base plate and the susceptor wall will produce undesirable buildup on the susceptor wall, the furnace

hardware and portions of the stacks. (Rudolph Decl. ¶ 6). In particular, any gas escaping through this gap will be passing through a small opening (the clearance gap) to a large open space (the furnace volume). (Rudolph Decl. ¶ 6). As a result, the gas will experience a very large residence time in the furnace and will form soot, tar and seal-coat on the furnace walls, the furnace hardware and portions of the stacks. (Rudolph Decl. ¶ 6).

Thus, as explained by Mr. Rudolph, any gas that escapes through the clearance gap between the outer edge of the base plate and the furnace walls is (1) uncontrolled; (2) not useful for the intended purpose; and (3) detrimental. It is respectfully submitted that Applicants' claimed invention is clearly distinguished from Christin et al. Christin et al. fails to disclose all of the claim limitations of Applicants' claims as now presented. Specifically, the clearance gap that the Examiner relies upon between the outer edge of the base plate and the furnace wall in Christin et al. does not disclose and is not equivalent to the claimed arrangement which directs gas flow into two predetermined portions, where the first portion passes to the center opening region of each stack and the second portion passes to the entire outer region of each stack.

The prior art of record also fails to disclose the additional limitations of dependent claims 25-42. Because each of these claims incorporate all of the limitations of allowable claim 24 from which they depend, claims 25-42 are also allowable. Therefore, any further arguments that could be made at this time in support of the additional limitations of Applicants' dependent claims would be superfluous and is unnecessary. *In re Fine*, 837 F.2d 1071, 1076 (Fed. Cir. 1988); *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1555 (Fed. Cir. 1983).

Conclusion

None of the prior art of record discloses the limitations of Applicants' claims as now presented. In response to the Examiner's comments, Applicants have amended the claims to clarify that the scope of the claims does not cover a gap around the outer edge of the base plate. As explained above, Applicants' claims are limited to a furnace with a sealed preheater, where one portion of gas passes to the center opening region of each stack in the furnace and another portion passes to the entire outer region of each stack. It is respectfully submitted that none of the prior art of record discloses the

limitations of Applicants' claims as now presented. Therefore, Applicants' claims are allowable. If the Examiner has any questions, the Examiner may call Applicants' attorney, Richard E. Stanley, Jr., at 312-321-4279. Accordingly, Applicants request reconsideration and allowance of the application.

Respectfully submitted,

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